

THE BLUEBERRY TIP WORM (*CONTARINIA VACCINII* FELT.), A NEW SPECIES OF MIDGE
ATTACKING CULTIVATED
BLUEBERRIES¹

BY BYRLEY F. DRIGGERS

ASSISTANT CRANBERRY SPECIALIST, NEW JERSEY AGRICULTURAL
EXPERIMENT STATIONS

The Blueberry Tip Worm was first observed in the summer of 1921. A severe infestation was reported at that time in the nursery bed of a blueberry propagator near New Lisbon, New Jersey. Adult specimens were collected by Mr. C. S. Beckwith, of the New Jersey Cranberry Station, who sent them to Dr. E. P. Felt for identification. From the specimens, all of which proved to be females, Dr. Felt tentatively described the midge as a new species, *Contarinia vaccinii*. As the females of the genus *Contarinia* are rather similar, publication of the description was deferred until there was an opportunity of studying the males.

The second and most recent outbreak of this insect occurred in the summer of 1925 at Whitesbog, New Jersey. Injured tips were found on plants in the nursery beds and greenhouse on July 5. The dried and blackened tips were examined, but no form of the insect was found inside the dead tip. Adult midges were noted around the plants in the greenhouse.

The plants in the greenhouse had begun a new growth on July 13. An examination of the partly open leaf buds disclosed the presence of larvæ on the inside of the young, loosely folded leaves. A number of injured tips containing larvæ were collected and placed in jelly glasses with half an inch of soil. Adults of both sexes emerged from the soil in about ten days. All new growth started by the plant soon became infested. Larvæ were collected from plants in the greenhouse as late as

¹ Paper No. 267 of the Journal series, New Jersey Agricultural Experiment Stations, Department of Entomology.

September 24. Additional larval material was collected on August 15 from the late summer growth on plants in the field. Adults of both sexes were reared from the larvæ found in the field. Male and female specimens reared from larvæ were sent to Dr. Felt who definitely described the insect as a new species.

DESCRIPTION AND EXTENT OF INJURY

Injury to the plant is caused by the larvæ feeding on the immature leaves of the partly open buds. Feeding of the larvæ on the two outside leaves of the bud is confined to the inner side of those two leaves. Subsequent growth on the outer side of the leaf, while growth on the inner side is retarded or stopped by the feeding of the larvæ, causes a cupping together of the two outside leaves, thus affording protection to the feeding larvæ. The larvæ continue feeding on the inside of the bud and eventually kill the young bud. Injury is first revealed by a lack of turgidity in the leaves and the failure of the bud to develop. The injured leaves turn yellow and, later, red spots appear on the outside of the exposed leaves. After the larvæ descend to the ground, the dead tip dries out and becomes blackened and brittle.

Conditions in the greenhouse and the nursery are apparently favorable to the development of this insect. One propagator found it necessary to move his nursery bed to a new location. At Whitesbog, during the spring of 1925, the plants made their first growth before the insect appeared in sufficient numbers to cause any noticeable injury. Practically one hundred per cent. infestation was found on plants in the greenhouse at Whitesbog from the first of July to the latter part of September.

DESCRIPTION OF THE INSECT

The Egg. Eggs are deposited in clusters between the loosely folded leaves of the unfolding bud. Clusters having ten and twelve eggs have been found. Eggs collected from plants in the greenhouse were colorless, cylindrical, slightly curved and blunt at both ends. The eggs average .3 mm. in length and .08 mm. in width. The eggs are held in mass and to the surface of the leaf by a sticky substance secreted by the female.

The Larva. The larvæ are colorless when first hatched. As the larvæ reach maturity, they become light orange in color, this color being more pronounced in some larvæ than in others. A peculiar horny process, the "breast bone," is found on the underside of the body in all mature larvæ. It has also been observed on larvæ apparently not quite mature. It is believed that the larvæ use the "breast bone" to rasp the tissues of the leaf, thus causing the contents of the cells to flow. The cell contents are then taken in through the mouth. Mature larvæ average a little over 2 mm. in length and .5 mm. in width. The body is flattened dorsoventrad, with the posterior end rounded and the anterior end pointed.

Movements of the larva were effected in two ways. Usually the larva moved by extending the anterior end and then drawing up the posterior end. At other times, and especially when on a dry surface, the larva would draw the two ends of its body together to form a bow or loop. Then, by a sort of spring movement, the larva would let go and propel itself several inches. Upon landing, the larva would resume crawling or arch its body for another leap.

The Pupa. The larvæ enter the soil to pupate. A sticky, gelatinous substance is secreted by the larva which causes particles of peat and sand to adhere to its body. When dry, the gelatinous secretion, mixed with sand and peat, forms a tough capsule within which the larva transforms to a pupa. The pupæ are bright orange in color when first formed. Later, the antennæ, legs, head and thorax become dark and the abdomen yellowish. Pupæ vary somewhat in size, averaging a little less than 2 mm. in length.

The pupæ wriggle partly out of the cocoons before the adults emerge. The ability of the adults to free themselves from the pupal case is apparently affected by the amount of moisture present. In one breeding tumbler, where the soil had become air dry before time for the adults to emerge, a number of adults were observed unable to free their legs and antennæ of the pupal cases. Only a few adults emerged completely in this particular cage. In other cages, where the moisture content of the soil was higher, adults emerged without any apparent difficulty.

The Adult. The adult is a delicate, long-legged, two-winged fly. It is most active in the early morning and late afternoon. In the middle of the day it is usually to be found resting on the underside of leaves or under the framework of the nursery bed. When disturbed they fly awkwardly to another resting place. The following descriptions of the male and female were drafted by Dr. E. P. Felt:

***Contarinia vaccinii* new species.**

MALE. Length, .75 mm. Antennæ a little longer than the body, sparsely haired, fuscous yellowish, 14 segments, the fifth having the basal portion of the stem with a length equal to its diameter, the distal part with a length one half greater than its diameter. Terminal segment, basal enlargement subglobose, basal portion of the stem with a length one fourth greater than its diameter, the distal enlargement sub-cylindric, somewhat produced with a length one half greater than its diameter and with a somewhat long stout apical process. Palpi, first segment irregular with a length nearly twice its diameter, the second a little longer, the third one fourth longer than the second, slender, the fourth as long as the third, dilated apically. Mesonotum fuscous yellowish, scutellum and postscutellum pale yellowish, abdomen fuscous yellowish, the genitalia yellowish. Halteres yellowish basally, fuscous apically. Legs a nearly uniform pale straw, the pulvilli as long as the strongly curved slender claws. Genitalia, basal clasp segment moderately long, stout, terminal clasp segment rather short, stout. Other structures indistinct in the preparation.

FEMALE. Length, 1 mm. Antennæ nearly as long as the body, sparsely haired, fuscous yellowish, 14 segments, the fifth with a stem about one third the length of the cylindrical basal enlargement, the latter with a length about twice its diameter. Terminal segment somewhat produced, with a length two and one half times its diameter and apically a somewhat short finger-like process. Mesonotum fuscous yellowish, scutellum and postscutellum pale yellowish, abdomen fuscous yellowish. Halteres yellowish basally, fuscous apically, legs pale straw, ovipositor as long as the abdomen, the terminal lobes sparsely setose, with a length five times the width and tapering to a narrowly rounded apex. Other characters nearly as in the male.

Type Cecid. A 3361 (b).

The specimens were reared from injured blueberry tips collected in the field. The colors are from alcoholic specimens. The dimensions of the stems of the fifth antennal segment in the male serve to differentiate this species from others presenting similar color characteristics.